REMARKS

Reconsideration is respectfully requested in view of the following remarks.

The Claims

Independent claim 12 has been amended to recite inserting anode slurry material comprising zinc particles and inserting cathode material comprising manganese dioxide and the casing has at least one flat surface along its length. Claim 12 has been further amended to recite that the separator has a bag shape and comprises a body surface having an open end and opposing closed end, wherein said body surface defines a cavity for insertion of anode material therein, wherein said separator body surface defining said cavity has an oblong configuration when viewed in cross section along a plane taken perpendicular to the cell's central longitudinal axis. Claim 12 as amended now also recites that there is a gap between at least a portion of the separator and the cathode and said gap is between about 2 and 4 mm wide and runs along the length of said separator. It is clear from Applicant's Fig. 16 that the separator 140 shown in Fig. 14B forms gap 145 which runs between the separator and cathode 110 along the length of the separator, since the width of the separator 140 shown in Fig. 14B is uniform along its length. Claim 12 also now recites that the electrolyte is added directly to said gap. (See Application, p. 68, lines 21-23.)

Independent claim 12 has been further amended to incorporate the subject matter of dependent claims 13 and 15-18. Accordingly, these claims have been canceled.

The Rejections

Claims 12, 13, 15 and 17-18 are rejected under 35 USC 102(b) or in the alternative over 35 USC 103(a) as being unpatentable over GB 851,202. (The Examiner had indicated that claim 11 was rejected under 35 USC 102(b) but it is assumed that claim 12 was intended.)

Claims 12-22 are rejected under 35 USC 103(a) as being unpatentable over GB 851,202 in view of Urmossy (US 4,039,729)

Discussion of the References

GB 851,202 discloses an electrochemical cell housed in a cylindrical casing as in Fig. 1. The cell is intended as a rechargeable cell wherein the anode 25 is a wet mixture comprising zinc powder coated with carboxy methyl cellulose and the cathode 16 is a mixture comprising manganese dioxide, and graphite and a small amount of Portland cement is added to bond the manganese dioxide and graphite particles. The cylindrical casing 10 has a closed end 12 and opposing open end. There is a copper screen current collector 24 inserted into the core of anode 25. Current collector 24 is electrically connected to negative terminal 34. The electrolyte is an alkaline electrolyte, specifically an aqueous solution of potassium hydroxide. There is a separator bag 22 fitted around the anode 25. The separator bag 22 is formed of a three layers of material. As shown in Fig. 1 the separator bag 22 may have a closed bottom facing the cell's positive terminal 12 and open top facing the cell's negative terminal plate 34. After electrolyte is poured into the anode material, the separator top may be closed over the anode. (p. 2, lines 9-13.) The anode

material 25 rests on a gas permeable elastic spacer 18 facing the casing closed end. Elastic spacer 18 is curved and may expand into space 20 abutting the cell's closed end 12. Similarly there is a curved elastic spacer 26 at the cell's opposite end covering the top of the anode 25. After the cell contents are inserted, the casing open end is closed with closing disk 30 and overlying negative terminal plate 34.

Anode material 25 consisting of zinc powder coated with carboxy methyl cellulose, cathode 16 comprising manganese dioxide and graphite and separator bag 22 therebetween are thus first inserted in place into the casing. It is clearly stated that electrolyte is then poured into the powdered zinc material coated with carboxy methyl cellulose. (See, p. 2, lines 5-10.) For example, after the cathode material 16 comprising manganese dioxide and graphite and separator 22 therebetween are inserted into the casing the reference states:

> "A copper screen anode collector 24 is then placed into the center of the cell, and the space remaining therearound is filled with powdered zinc 25 coated with carboxy methyl cellulose. Alkaline electrolyte is then poured onto this powder. After no more free liquid appears on top of the powder, the separator bag is folded together over the top of the powder." (p. 2, lines 5-13)

It is thus evident that the aqueous alkaline electrolyte is poured directly onto the dry anode material comprising zinc powder coated with the carboxy methyl cellulose. The carboxy methyl cellulose is a fibrous powder which swells upon contact with water forming a viscous solution. It will be evident that

since spacers 18 and 26 are elastic, they are capable of expanding into space 20 and 28, respectively, as anode 25 expands upon addition of electrolyte.

As may be seen from GB 851,202, Fig. 1, there is no discernible space between the cathode 16 and separator 22 as separator 22 is shown flush against the inside surface cathode 16. The reference does not contemplate any gap between separator 22 and cathode 16. The reference does not contemplate pouring the electrolyte directly into any gap between separator and cathode. In fact there is no discernible gap between separator and cathode contemplated or disclosed in the reference and it is clearly stated in the reference that the electrolyte is poured into the anode material comprising zinc powder. (p. 2, lines 5-10)

Urmossy (US 4,039,729) discloses a rechargeable cell which has a casing having flat surfaces. The cell has multiple negative electrodes formed of solid zinc and multiple positive electrodes comprising nickel oxide. The cell has a separator surrounding the positive electrodes and the separator is spaced apart from the negative electrodes. That is, there is discernible space between the separator and the negative electrodes and this space is filled with liquid electrolyte. The electrolyte may be an aqueous solution comprising potassium hydroxide and also contains K_2SiO_3. A representative specific embodiment is shown, e.g. Fig. 3. In the Fig. 3 embodiment there are three negative zinc electrodes 27 which have grooved surfaces facing towards the cell interior. The zinc electrodes 27 are spaced apart from each other. The cell has two positive electrodes 25 comprising nickel oxide inserted into the cell casing so each positive electrode 25 is positioned between two

of the three negative electrodes as shown in Fig. 3. There is a separator 31 covering the surface of each of the two positive electrodes 25. There is discernible space between each of the negative zinc electrodes 27 and separator 31. The space is filled with liquid electrolyte comprising aqueous potassium hydroxide and K_2SiO_3. Another feature of the cell is that it includes an auxiliary electrode 29 formed of a porous electrically conductive material made of a conductive netting, perforated plate or screen plate of thickness between about 0.015 mm and 0.15 mm. When the auxiliary electrode 29 is connected to the zinc anodes 27 it functions as a dendrite barrier preventing short circuiting between negative and positive electrodes. The auxiliary electrode 29 also helps during afterdischarge to remove residual zinc from the negative electrode current collectors. There is clearly space between the zinc electrodes 27 and the separator 31 surface as shown in Fig. 3. On the other hand the separator 31 abuts and covers the surface of the positive electrodes 25.

With respect to Fig. 1 there is a separator 6 shown abutting and surrounding the positive electrode 2. It is stated in the specification that separator 6 is formed of microporous polypropylene which forms a pocket or interspace around the positive electrode 2 which extends passed the top edge of nickel oxide electrode 2 and above electrolyte level 7. (col 7, lines 14-20) There does not appear to be intended gap between positive electrode 2 and separator 6 as the drawing is schematic in nature. Even if there is some space between positive electrode 2 and separator 6 (Fig. 1) the electrolyte liquid would be added to the primary space between negative zinc electrode 4 and separator 6 with residual electrolyte eventually filling any space between positive electrode 2 and separator 6.

Since zinc electrode 4 is so remote from separator 6 any expansion of zinc electrode 4 would simply cause the electrolyte level 7 to rise in the cell.

The reference Urmossy (US 4,039,729) is not concerned with and does not disclose a negative electrode (anode) formed of a zinc slurry which expands upon contact with alkaline electrolyte thereby causing the anode to expand and close a gap along the length of the separator between separator and cathode. The solid zinc electrode 4 shown in the reference would not expand as much as the zinc slurry. In any event the zinc electrode 4 is located remote from separator 6 so any expansion in electrode 4 would simply cause electrolyte level 7 to rise without necessarily causing any repositioning in separator 6.

Arguments Against the Rejections

Claims 12, 13, 15 and 17-18 are rejected under 35 USC 102(b) or in the alternative over 35 USC 103(a) as being unpatentable over GB 851,202.

The Examiner maintains that GB 851,202 teaches an alkaline cell with zinc and manganese dioxide electrodes, and casing comprising: a)inserting cathode material into the casing so that a cathode surface faces the casing the cell interior; b) inserting a separator into the casing so that a surface of the separator faces said exposed surface of said cathode, there being a gap between at least a portion of said separator and the cathode; c) inserting anode material into said casing so that there is a gap between said anode and cathode; d) adding alkaline electrolyte solution to said gap; wherein at a least a portion of said added electrolyte is absorbed into the anode

thereby causing the anode to expand and close said gap between separator and cathode.

As may be seen from the GB 851,202 Fig. 1 the separator 22 lies flush against the cathode 16 over the entire length of the separator. There is no gap visible between separator 22 and the cathode 16 over the length of the separator. The Examiner acknowledges that the reference does not specifically teach there being a gap between at least a portion of the said separator and the cathode. The Examiner surmises that there must be a gap between separator and cathode in GB 851,202, since the anode and cathode compositions are the same or similar to those in Applicant's cell. Therefore, there must be expansion of the anode into some gap between cathode and separator in the reference as in Applicant's invention. In rebuttal Applicant points out that there is clearly no gap between separator and cathode shown or described GB 851,202. For example, in Fig. 1 separator 22 is shown flush against the surface of the cathode 16. However, even if the anode and cathode compositions in Applicant's cell are similar to those in GB 851,202 any anode expansion occurring in the reference cell can be absorbed by the elastic spacers 18 and 26 at the bottom and top, respectively, of the reference cell (Fig. 1). Therefore there need not be a gap between the reference separator 22 and cathode 16 to absorb any anode expansion.

Applicant's independent claim 12 has been amended to recited that there is a gap between the separator and the cathode, wherein said gap runs along the length of the separator. Claim 12 has been further amended to recite that said gap is between 2 and 4 mm wide. The reference GB 851,202 does not disclose such gap and does not teach adding electrolyte to

said gap and therefore the rejection under 35 USC 102 is traversed. In order for a reference to anticipate under 35 USC 102(e) it must show all of the features of Applicant's claim within the four corners of the reference. See, e.g. In re Spada, 15 USPQ2d 1655 (Fed. Cir. 1990). Withdrawal of the rejection under 35 USC 102 in view of GB 851,202 is requested.

Similarly, reference GB 851,202 does not render Applicant's independent claim 12 obvious under 35 USC 103, since there is no indication that there is gap between separator and cathode running along the length of the separator disclosed or suggested in the reference. Furthermore, the reference specifically teaches that electrolyte is poured directly into the anode material 25. (GB 851,202 at p.2, lines 9-10) The reference does not teach or suggest that electrolyte is poured into any gap between separator and cathode and in fact there is no such gap expressly shown or described. A person skilled in the art would need Applicant's disclosure before him to supply the missing information in Applicant's claim 12, namely: a gap between separator and cathode and the step of pouring electrolyte directly into said gap to cause the anode to expand therein. Such hindsight analysis is inapplicable. See, e.g., Grain Processing Corp. v. American Maize-Products Co., 5 USPQ2d 1788, 1792 (Fed. Cir. 1988). See also, In re Dembiczak, 175 F.3d 994, 999, 50 USPQ2d 1614, 1617 (Fed. Cir. 1999). We "cannot use hindsight reconstruction to pick and choose among isolated disclosures in the prior art to deprecate the claimed invention." In re Fine, 837 F.2d 1071, 1075, 5 USPQ2d 1780, 1783 (Fed. Cir. 1988). To support a rejection under 35 USC 103 the references must provide a basis within their own teachings and not the teaching of Applicant's application. Accordingly, it is believed that amended independent claim 12 is now patentably

distinguishable over the GB 851,202 and the rejection under 35 USC 103 in view of this reference is now traversed. Withdrawal of the rejection of claim 12 under 35 USC 103 in view of GB 851,202 is requested upon the Examiner's reconsideration. The subject matter of dependent Claims 13, 15 and 17-18 have been incorporated into amended base claim 12 for added clarity. Accordingly, these dependent claims have been canceled. The rejection of these claims under 35 USC 103 in view of GB 851,202 is thus rendered moot.

Claims 12-22 are rejected under 35 USC 103(a) as being unpatentable over GB 851,202 in view of Urmossy (US 4,039,729)

The Examiner indicates that Urmossy (US 4,039,729) teaches that the spacing between the current collector of the zinc electrode and the auxiliary structure is 0.5 to 8 mm. Applicant points out that the auxiliary structure as referenced in Urmossy is an electrode, not a separator. The term "separator" between anode and cathode as commonly used in the electrochemical arts is well understood to be a non-electrode. The separator is of non electrically conductive material, e.g. cellulosic material or comprising cellulosic and polyvinylalcohol fibers and the like, which is sufficiently porous to allow electrolyte to pass therethrough. By contrast the auxiliary structure referenced in Urmossy is an auxiliary electrode. It is stated in Urmossy "The auxiliary electrode consists of a porous , electrically conductive material and is made preferably of netting, perforated plate, or screen plate of a thickness of 0.05 - 0.15 mm. (col. 5, lines 65-68) The auxiliary electrode is shown, for example, as electrode 28 in Fig. 3. Applicant has amended independent claim 12 to recite that the "separator" is of "non electrically conductive material permeable to alkaline

electrolyte". Support appears in the Application with recitation of electrolyte permeable materials such as cellulose or cellulosic and polyvinylalcohol fibers, which are clearly nonconductive. (Application, p. 3, lines 11-13 and p, 45, lines 8-12.)

Neither reference GB 851,202 nor Urmossy (US 4,039,729) teaches or suggests a gap between separator and cathode wherein electrolyte is added directly into said gap and is absorbed by the anode, thereby causing the anode to expand and close said gap. In particular neither of these references discloses a gap between separator and cathode of between about 2 and 4 mm width running along the length of the separator, as in Applicant's amended claim 12. The Examiner references the zinc anodes shown in Urmossy, e.g. anode 4, Fig. 1 which have grooves on their surface facing the cell interior. The Examiner contends it would be obvious to leave enough space between the separator 6 and the cathode 2 to allow for expansion of the zinc electrodes 4. However, in the cell design shown in Urmossy, e.g. Fig. 1, there is enough cell head space shown over electrolyte level 7 so that if the zinc anode 4 expanded, the electrolyte level 7 would simply rise to accommodate the expansion. Thus, in the cell design shown in Urmossy there does not have to be space between the separator 6 and cathode 2 to accommodate any zinc anode expansion. Also the cell chemistry of Urmossy is different from Applicant's. Urmossy's zinc anode appears to be a solid anode whereas Applicant's anode is formed of a slurry comprising zinc particles. Applicant's cathode comprises manganese dioxide, whereas Urmossy's cathode is a nickel oxide cathode. The solid zinc anode 4 of Urmossy may not be as prone to expansion as a zinc slurry. In any event Applicant has amended independent claim 12 to reflect these differences in cell chemistry.

In sum neither reference GB 851,202 nor Urmossy (US 4,039,729) teaches a gap between separator and cathode in an alkaline cell. More specifically neither reference teaches a gap between 2-4 mm wide between separator and cathode running along the length of the separator. Neither reference teaches adding alkaline electrolyte directly to said gap thereby causing the anode to expand and close said gap between separator and cathode. The Examiner acknowledges that GB 851,202 does not specifically teach there being a gap between the separator and cathode. (Instant Action at p.4, last two lines). The Examiner acknowledges that Urmossy does not teach a gap (between separator and cathode) of between 2 - 4 mm. (Instant Action at p. 5, lines 5-6). A person skilled in the art would require Applicant's disclosure to supply the missing information of Applicant's method as reflected in amended independent claim 12. Such hindsight analysis is inapplicable.

Accordingly, amended independent claim 12 is believed patentable under 35 USC 103 over GB 851,202 or Urmossy (US 4,039,729) whether viewed alone or in combination. The rejection under 35 USC 103 on the basis of GB 851,202 in view of Urmossy (US 4,039,729) is believed traversed. Dependent claims 14, 19, and 20-22 reflect specific embodiments of the invention which further limit the subject matter of base claim 12. Thus, these dependent claims should be allowable if base claim 12 is allowed. Withdrawal of the rejection under 35 USC 103 upon the Examiner's reconsideration is requested.

The drawings filed Nov. 26, 2003 have been approved.

Applicant has made the claims Amendment with every effort to place the application in condition for allowance. Formal allowance of the Application is respectfully solicited.

The undersigned attorney solicits a telephone call from the Examiner to clarify any questions which the Examiner may have concerning the application. Authorization is hereby given to debit Deposit Account 502271 for any amount owing or credit the same account for any overcharges in connection with this communication.

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Respectfully submitted,

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